



PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Fang et al.

Application No. 09/595,227

Art Unit: 3723

Examiner: H. Shakeri

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For: METHOD FOR POLISHING A
MEMORY OR RIGID DISK WITH
A PHOSPHATE ION-
CONTAINING POLISHING
SYSTEM

**PENDING CLAIMS AFTER AMENDMENTS
MADE IN RESPONSE TO OFFICE ACTION DATED SEPTEMBER 25, 2001**

1. A method for planarizing or polishing the surface of a memory or rigid disk comprising abrading at least a portion of the surface with a polishing system comprising (i) a polishing composition comprising water, an oxidizing agent, and about 0.04 M or higher phosphate ion or phosphonate ion, and (ii) abrasive material.

2. The method of claim 1, wherein the polishing composition comprises about 0.04 M or higher phosphate ion.

3. The method of claim 1, wherein the polishing composition comprises about 0.04 M or higher phosphonate ion.

4. The method of claim 1, wherein the surface of the memory or rigid disk comprises nickel-phosphorus.

5. The method of claim 1, wherein the polishing system has a pH of about 1-12.

6. The method of claim 5, wherein the polishing system has a pH of about 2-5.

7. The method of claim 1, wherein the abrasive material is abrasive particles selected from the group consisting of alumina, silica, titania, ceria, zirconia, germania, magnesia, coformed products thereof, and mixtures thereof.

8. The method of claim 7, wherein the abrasive particles are silica particles.

9. The method of claim 8, wherein the abrasive particles are condensation-polymerized silica particles.

10. The method of claim 1, wherein the abrasive material is abrasive particles present in the polishing composition in a concentration of about 0.1 wt.% or more.

11. The method of claim 1, wherein the abrasive material is fixed on or in a polishing pad.

12. The method of claim 1, wherein the oxidizing agent is selected from the group consisting of per-compounds, bromates, perbromates, chlorates, perchlorates, dichromates, periodates, iodates, nitrates, permanganates, sulfates, citrates, cerium (IV) compounds, oxidizing metal salts, oxidizing metal complexes, nonmetallic oxidizing acids, ferricyanides, trioxides, and salts thereof, and mixtures thereof.

13. The method of claim 12, wherein the oxidizing agent is selected from the group consisting of peroxides, persulfates, percarbonates, and salts thereof, and mixtures thereof.

14. The method of claim 12, wherein the oxidizing agent is selected from the group consisting of hydrogen peroxide, ammonium persulfate, potassium iodate, and mixtures thereof.

15. The method of claim 1, wherein the oxidizing agent is present in the polishing composition in an amount of about 0.01 wt.% or more.

16. The method of claim 15, wherein the oxidizing agent is present in the polishing composition in an amount of about 0.1 wt.% or more.

17. The method of claim 2, wherein the phosphate ion is derived from a water-soluble phosphate.

18. The method of claim 17, wherein the phosphate ion is derived from a source of phosphate ion selected from the group consisting of orthophosphates, polyphosphates, and mixtures thereof.

19. The method of claim 17, wherein the phosphate ion is derived from a source of phosphate ion selected from the group consisting of ammonium phosphate, potassium phosphate, sodium tripolyphosphate, and mixtures thereof.

20. The method of claim 3, wherein the phosphonate ion is derived from a source of phosphonate ion selected from the group consisting of amine-containing phosphonates, imine-containing phosphonates, imide-containing phosphonates, amide-containing phosphonates, phosphonate compounds containing no nitrogen, and mixtures thereof.

21. The method of claim 3, wherein the phosphonate ion is derived from a source of phosphonate ion selected from the group consisting of phosphoacetic acid, 2-aminoethyl dihydrogen phosphate, aminotri-(methylenephosphonic acid), nitrilotris(methylene)triphosphonic acid, 1-hydroxyethylidene-1-diphosphonic acid, and diethylenetriaminepenta-(methylenephosphonic acid), and mixtures thereof.

22. The method of claim 1, wherein the phosphate-ion or phosphonate ion is present in the polishing composition in an amount of about 0.06 M or higher.

23. The method of claim 1, wherein the phosphate-ion or phosphonate ion is present in the polishing composition in an amount of about 0.08 M or higher.

24. A system for planarizing or polishing a substrate comprising (i) a polishing composition comprising water, an oxidizing agent, and about 0.04 M or higher phosphate ion or phosphonate ion, and (ii) silica particles.

25. The system of claim 24, wherein the substrate is a memory or rigid disk.

26. The system of claim 25, wherein the memory or rigid disk comprises nickel-phosphorus.

27. The system of claim 26, wherein the silica particles are condensation-polymerized silica particles.

28. The system of claim 24, wherein the polishing composition comprises 0.04 M or higher phosphate ion.

29. The system of claim 24, wherein the polishing composition comprises 0.04 M or higher phosphonate ion.

30. The system of claim 28, wherein the phosphate ion is derived from a water-soluble phosphate.

31. The system of claim 30, wherein the phosphate ion is derived from a source of phosphate ion selected from the group consisting of orthophosphates, polyphosphates, and mixtures thereof.

32. The system of claim 30, wherein the phosphate ion is derived from a source of phosphate ion selected from the group consisting of ammonium phosphate, potassium phosphate, sodium tripolyphosphate, and mixtures thereof.

33. The system of claim 29, wherein the phosphonate ion is derived from a source of phosphonate ion selected from the group consisting of amine-containing phosphonates, imine-containing phosphonates, imide-containing phosphonates, amide-containing phosphonates, phosphonate compounds containing no nitrogen, and mixtures thereof.

34. The system of claim 29, wherein the phosphonate ion is derived from a source of phosphonate ion selected from the group consisting of phosphoacetic acid, 2-aminoethyl dihydrogen phosphate, aminotri-(methylenephosphonic acid), nitrilotris(methylene)triphosphonic acid, 1-hydroxyethylidene-1-diphosphonic acid, diethylenetriaminepenta-(methylenephosphonic acid), and mixtures thereof.